


THE USE OF CANNABIDIOL IN NEURODEGENERATIVE PATHOLOGIES AND THE ROLE OF THE PHYSIOTHERAPIST

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ABSTRACT

The document explores the use of cannabidiol (CBD) in the treatment of neurodegenerative pathologies, highlighting its therapeutic potential in conditions such as epilepsy, multiple sclerosis, Parkinson's and Alzheimer's disease. CBD, a non-psychoactive compound from the Cannabis sativa plant, interacts with the endocannabinoid system, exhibiting anti-inflammatory, neuroprotective, and anxiolytic properties. In physiotherapy, CBD emerges as a complementary approach that can improve functionality, reduce neuropathic pain and spasticity, as well as contribute to the control of motor and behavioral symptoms associated with these diseases. The work also addresses challenges related to response variability, lack of standardization of dosages, and the need for more long-term research. Regulations from agencies such as COFFITO and ANVISA are mentioned, reinforcing the safety and applicability of CBD by trained physiotherapists. The study concludes that CBD has significant potential, but that scientific and regulatory barriers still need to be overcome for its full integration into clinical treatments.

Keywords: Cannabidiol (CBD). Neurodegenerative pathologies and physiotherapy.

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INTRODUCTION

Cannabidiol (CBD) is one of more than 100 chemical compounds known as cannabinoids, found in the *Cannabis sativa* plant. Unlike tetrahydrocannabinol (THC), CBD does not produce psychoactive effects and has stood out in the healthcare industry for its therapeutic potential in various medical conditions, especially neurological disorders (GEVEHR, 2022).

Brucki et al. (2021), describe that CBD can alleviate symptoms of conditions such as epilepsy, multiple sclerosis, Parkinson's disease, and Alzheimer's disease. With the growing interest in CBD, both in the scientific community and in the general public, it is necessary to broaden the understanding of its therapeutic impacts, safety profile, and potential clinical uses, as well as to identify existing knowledge gaps and provide information on advantages and disadvantages.

In physiotherapy, the use of CBD can enhance the improvement of patients' functionality and quality of life, especially when associated with treatment plans for motor and pain disorders, being essential for the neurofunctional rehabilitation process.

Silva et al. (2024), in their research, describe that CBD has a favorable safety profile, with minimal toxicity, which reinforces its value as a supplemental approach in physiotherapy interventions.

Therefore, this chapter sought to describe the most recent scientific evidence on the properties, safety and uses of CBD in neurodegenerative diseases, delving into clinical and preclinical research on the potential benefits of CBD in diseases such as epilepsy, multiple sclerosis, Parkinson's disease and Alzheimer's disease.

DEVELOPMENT

EPIDEMIOLOGY OF MAJOR NEURODEGENERATIVE DISEASES

Neurodegenerative diseases are characterized by progressive loss of the structure and function of nerve cells in the central or peripheral nervous system, and often course with epilepsy, affecting a significant portion of the population with significant functional and autonomy impairments, compromising independence, quality and length of life.

Below are the estimated percentages of people affected by some of these conditions:

Epilepsia

Epilepsy is one of the most common neurological diseases in the world. It is estimated that about 1% of the world's population is affected by this condition. This corresponds to approximately 50 million people globally, according to data from the World



Health Organization (WHO, 2022). In low- and middle-income countries, prevalence may be higher due to factors such as central nervous system infections and lack of access to adequate medical care.

Multiple Sclerosis (MS)

Multiple sclerosis affects approximately 2.8 million people worldwide, or about 0.04% of the global population. Prevalence varies considerably between different regions, being more common in high-latitude countries, such as those in Europe and North America. The Multiple Sclerosis Atlas 2020, published by the International Multiple Sclerosis Federation (MSIF), indicates an increasing global prevalence, especially in specific regions (MSIF, 2020).

Parkinson's disease

Parkinson's disease is the second most common neurodegenerative disease, after Alzheimer's disease. The estimated global prevalence is about 0.3% of the general population, but this rate increases significantly with age, affecting approximately 1% of people over the age of 60. Globally, it is estimated that more than 10 million people are living with Parkinson's disease (GBD, 2019; PARKINSON'S FOUNDATION, 2023).

Alzheimer's Disease

Alzheimer's disease and other dementias affect approximately 55 million people worldwide, which corresponds to about 0.7% of the global population. Alzheimer's Disease International (ADI) predicts that this number could triple by 2050, due to population aging, especially in low- and middle-income countries (ADI, 2022).

Prevalence increases exponentially with age, affecting about 5% to 8% of people over the age of 65.

THE ENDOCANNABINOID SYSTEM AND CANNABIDIOL

CBD is a non-psychoactive chemical compound found in the *Cannabis sativa* plant, which acts primarily on the endocannabinoid system, which is responsible for regular physiological functions such as pain, mood, appetite, and memory. Studies have demonstrated its anti-inflammatory, antioxidant, neuroprotective, and anxiolytic properties (BRUCKI et al., 2015).

The endocannabinoid system, discovered in the 1990s, is composed of endocannabinoids, cannabinoid receptors, and enzymes responsible for the synthesis and



manipulation of these compounds. CBD, by interacting with CB1 and CB2 receptors, modulates the activity of this system, influencing processes such as pain and inflammation (ALVES et al., 2019). In addition, CBD interacts with other signaling systems, such as serotonin and vanilloid receptors, which may explain its anxiolytic, antidepressant, and analgesic effects (ALVES et al., 2019; SCHLESNER et al., 2022).

The use of CBD in medicine has gained prominence due to its effects on various neurological conditions. Initially, it was used to treat drug-resistant epilepsy, but recent research indicates its potential in pathologies such as multiple sclerosis and Alzheimer's, due to its anti-inflammatory and neuroprotective actions (COSTA et al., 2011; LUZ et al., 2020).

THE USE OF CANNABIDIOL IN PHYSIOTHERAPY

As provided by the Federal Council of Physical Therapy and Occupational Therapy (COFFITO), properly trained physical therapists can prescribe therapeutic cannabis, including CBD, as part of an integrated and individualized treatment. This practice is especially relevant in the management of chronic diseases and in the rehabilitation of neurological conditions, where CBD acts as an adjunct in pain control, reduction of inflammation, and improvement of motor function (CREFITO 2, 2024).

The Regulations of the National Health Surveillance Agency (ANVISA) ensure that the prescription is carried out properly, requiring information provided about the patient and the dosage in the prescription, ensuring safety in the therapeutic use of these products. With the evolution of treatments and the increasing accessibility of medical cannabis, the role of the physiotherapist expands, enabling more comprehensive and practical approaches in health promotion and rehabilitation (CREFITO 2, 2024).

CBD has shown promise in the management of neuromotor conditions, as well as in the involvement of spasticity and chronic pain. Patients with neuromotor sequelae, such as spastic tetraparesis and encephalopathies, are often treated with muscle relaxants and antispasmodics, however, long-term use of these drugs can cause harmful side effects. CBD emerges as a less invasive therapeutic alternative, with the potential to improve the quality of life of these patients, relieving spasticity and controlling pain (SILVA et al., 2024).

According to Silva et al. (2024), research indicates that the endocannabinoid system, activated by CBD, can promote the recovery of motor and cognitive functions. The authors describe in a case report of a patient with spastic tetraparesis, treated with CBD oil, demonstrated significant improvement in spasticity, cognition, and sleep pattern, as well as a reduction in the use of other medications, such as trazodone and tizanidine.



The analgesic potential of CBD is also relevant, especially in cases of neuropathic pain, resistant to conventional painkillers. Although there are still discussions about the optimal dosage and duration of treatment, CBD has been shown to be effective in reducing pain limits and controlling spasticity, expanding the therapeutic options of physiotherapists in the treatment of complex neurological conditions (SILVA et al., 2024).

THE USE OF CANNABIDIOL IN EPILEPSY

The use of CBD in the treatment of epilepsy, especially in cases resistant to conventional treatments, is extremely trained. Clinical studies have shown that CBD can significantly reduce the frequency of epileptic seizures. In Dravet syndrome, for example, CBD impairs seizures by up to 50% in some patients (SAMPAIO et al., 2024). In patients with Lennox-Gastaut syndrome, CBD also showed positive results, with a significant reduction in seizures (SILVINATO et al., 2022).

While CBD is generally well-tolerated, adverse effects such as death, fatigue, and diarrhea have been reported in some cases. The safety and efficacy of CBD treatment continue to be investigated (OSHIRO et al., 2022).

THE USE OF CANNABIDIOL IN MULTIPLE SCLEROSIS

Multiple sclerosis (MS) is a chronic autoimmune disease that affects the central nervous system, causing muscle spasms, pain, and fatigue. CBD has been shown to be effective in relieving these symptoms, especially in controlling muscle spasticity and neuropathic pain. A study of MS patients who used CBD alone reported a significant reduction in neuropathic pain (LEVADA et al., 2022).

However, the variability in patients' response to treatment and the lack of standardization in dosages are challenges to be overcome in future research (LAFUENTE et al., 2022).

THE USE OF CANNABIDIOL IN PARKINSON'S DISEASE

Parkinson's disease is a neurodegenerative condition that affects motor control, causing tremors, muscle tremors, and bradykinesia. Studies indicate that CBD can improve quality of life and reduce psychosis in Parkinson's patients (RIEDER, 2020). Additionally, preclinical research suggests that CBD may have neuroprotective effects, slowing disease progression (TAVARES et al., 2023).



THE USE OF CANNABIDIOL IN ALZHEIMER'S DISEASE

Alzheimer's disease is characterized by progressive loss of memory and other cognitive functions. Preclinical studies in animal models have shown that CBD can reduce inflammation and the accumulation of beta-amyloid plaques, characteristics of the disease (TAVARES et al., 2023). Additionally, CBD can improve behavioral symptoms such as improvement and aggression in Alzheimer's patients, providing improved quality of life for both patients and their caregivers (KIM et al., 2019).

RELATIONSHIP BETWEEN SUCCESS AND FAILURE OF CANNABIDIOL RESEARCH IN THE TREATMENT OF NEUROLOGICAL PATHOLOGIES

Below we present a table that summarizes the research related to the use of cannabidiol (CBD) in the treatment of neurodegenerative pathologies, highlighting both the successes and failures observed in clinical and preclinical studies researched.

Pathology	Study/Authors	Success (Positive Results)	Failure (Negative Results)
Epilepsy (Síndrome de Dravet e Lennox-Gastaut)	SAMPAIO et al. (2024); SILVINATO et al. (2022)	Significant reduction in the frequency of epileptic seizures in up to 50% of patients with epilepsy resistant to conventional treatments.	Reported side effects include destruction, fatigue, and diarrhea. In some cases, patients have not responded to treatment.
Multiple Sclerosis (MS)	FILIPPINI et al. (2022); LEVADA et al. (2022)	Significant improvement in muscle spasticity and disruption of neuropathic pain in MS patients. Reduced inflammation and improved quality of life.	Variability in treatment response observed among patients. Further studies are needed to standardize dosages and evaluate drug interactions.
Parkinson's disease	RIEDER (2020); TAVARES et al. (2023)	Improvement in quality of life, reduction of psychosis and neuroprotective effects observed in preclinical studies. Relief of motor and non-motor symptoms.	Studies on initial forecasts. Some patients did not respond to treatment. Variability in response to CBD. Need for larger-scale studies.
Alzheimer's disease	CHEN et al. (2023); TAVARES et al. (2023)	Reduction of neuroinflammation and beta-amyloid plaque accumulation in animal models. Improvement of behavioral symptoms, such as improvement and aggressiveness.	Limited clinical studies. Lack of standardization of effective dosages. Human studies still in their early stages.
Neuropathic Pain	SILVA e cols. (2024); BRUCKI et al. (2021)	Efficacy in the control of neuropathic pain, especially in chronic pain conditions associated with neurological pathologies. Reduced use of opioids and other analgesics.	The determination of the optimal dosage is still uncertain. Some patients say limited response to treatment with CBD alone.
Neuromotor Spasticity	SILVA and cols. (2024); CREFITO 2 (2024)	Significant improvement in spasticity and motor function in patients with spastic tetraparesis. Reduction in the use of traditional medications, such as muscle relaxants.	Some patients participated in mild side effects such as death and dry mouth. Variable responses among patients.



About the Successes, we can highlight:

- **Epilepsy:** The use of CBD in patients with drug-resistant epilepsy, such as Dravet and Lennox-Gastaut syndromes, has been shown to be one of the greatest successes, with a significant reduction in epileptic seizures.
- **Multiple Sclerosis:** Several studies indicate that CBD can improve symptoms of spasticity and neuropathic pain in MS patients, providing significant relief and improved quality of life.
- **Parkinson's disease:** Early research suggests that CBD may have neuroprotective effects and reduce psychosis in Parkinson's patients, which improves quality of life.
- **Alzheimer's disease:** Preclinical studies suggest that CBD may help reduce inflammation and the buildup of beta-amyloid plaques, which are hallmarks of the disease, as well as improve behavioral and behavioral symptoms.

About the Failures we can highlight:

- **Epilepsy:** Although many patients responded positively, some studies reported side effects such as dizziness and diarrhea, as well as a limited response in some cases.
- **Multiple Sclerosis:** Variability in patient response and lack of standardization in dosages pose challenges, and some patients were not asked for any significant improvement.
- **Parkinson's and Alzheimer's disease:** While the studies are promising, they are still in early designs, with inconsistent responses among patients and the need for more research to confirm the benefits and determine optimal dosages.

FINAL CONSIDERATIONS

The growing body of scientific evidence on the use of cannabidiol (CBD) in complex neurological pathologies such as epilepsy, multiple sclerosis, Parkinson's and Alzheimer's disease points to its promising therapeutic potential. CBD has been shown to be effective in reducing debilitating symptoms such as epileptic seizures, muscle spasticity, neuropathic pain, and behavioral disorders, offering patients an alternative or complement to conventional treatments. In addition, its anti-inflammatory, neuroprotective, and anxiolytic properties reinforce its relevance in the management of neurodegenerative and chronic diseases.



In physiotherapy, the use of CBD opens up new possibilities for intervention, especially in the treatment of neuromotor disorders and conditions associated with chronic pain. CBD can be integrated into rehabilitation plans as an adjunct resource, contributing to the collapse of symptoms and, consequently, to the improvement of patients' functionality and quality of life. CBD's ability to modulate the endocannabinoid system and other signaling systems in the body makes it a valuable tool for the physical therapist, who can prescribe its use in a safe and individualized manner, as regulated by the Federal Council of Physical Therapy and Occupational Therapy (COFFITO).

However, despite the promising results, there are still considerable challenges that need to be overcome in order for CBD to be fully integrated into clinical practices safely and effectively. Among these challenges, the variability in patient response, the lack of standardization in dosages, and the lack of long-term studies that can confirm the reported benefits and ensure the safety of prolonged use stand out. CBD's interaction with other medications should also be carefully monitored, especially in patients with concomitant therapies, such as those suffering from chronic or neurodegenerative diseases.

In addition, it is necessary that future studies focus on well-designed clinical trials, with larger samples and longer follow-ups, in order to establish more precise therapeutic guidelines based on solid evidence. The research should also involve different population subgroups, considering factors such as age, gender, comorbidities, and genetic variations that may influence the response to CBD treatment.

Therefore, as knowledge about CBD continues to expand, it is possible that its use in neurological treatments will advance in a more consolidated way, becoming a therapeutic option of choice for physiotherapists and other healthcare professionals. The integration of CBD into physiotherapy treatment plans could represent a significant advance in the search for safer, more practical, and patient-centered therapeutic approaches, especially in the context of complex and multifactorial neurological diseases. As research matures and clear clinical protocols are established, the use of CBD can transform the landscape of neurofunctional rehabilitation, offering new hope for patients suffering from debilitating conditions.



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